DOCUMENT RESUME

ED 279 685 TM 870 072

AUTHOR Kearney, C. Philip
TITLE NAEP: A National Data System for the 21st Century.
PUB DATE 19 Sep 86
NOTE 34p.; One of 46 papers commissioned by the Study Group on the National Assessment of Student Achievement and cited in Appendix B to their final report "The Nation's Report Card" (TM 870 049). For other papers in this group, see TM 870 050-094.
PUB TYPE Viewpoints (120)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Databases; Data Collection; *Educational Assessment; Educational Testing; Elementary Secondary Education; Information Systems; *Information Utilization; *Measurement Objectives; National Competency Tests; *National Surveys; Testing Problems; *Testing Programs
IDENTIFIERS *National Assessment of Educational Progress

ABSTRACT

The National Assessment of Educational Progress (NAEP) has the potential to become a national data system and to meet the rapidly expanding needs for educational information. Historically, NAEP has had the objectives of providing relevant information for federal, state, and local policymakers; establishing a research database; and monitoring performance levels. Now, increasing emphasis on the linkages between and among achievement outcomes, settings, and processes is encouraged. Suggestions for the evolution of the future NAEP database include ideas for improving data collection and storage. A number of requirements are summarized. The system should be comprehensive, encompassing background characteristics, the schooling process, and outcomes. Data elements, files, and records should be linked. Data should be representative, accurate, comparable, timely, private, and secure. Plans for processing and analysis and for the flow of information must be in place. System costs should be shared by various users, rather than relying entirely on federal support. (GDC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED279685

NAEP: A National Data System for the 21st Century

C. Philip Kearney

University of Michigan

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☑ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

C. P. Kearney

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Paper commissioned by

THE STUDY GROUP ON THE NATIONAL ASSESSMENT OF STUDENT ACHIEVEMENT

1986

TM 870 072

BEST COPY AVAILABLE

NAEP: A NATIONAL DATA SYSTEM FOR THE 21ST CENTURY

C. Philip Kearney
The University of Michigan

ACKNOWLEDGEMENT: For many of the ideas in this paper, I am indebted to three colleagues, George Hall, Richard Jaeger, and David Wiley, with whom I worked during 1985 in the preparation of a plan for an alternative national data system for elementary and secondary education. This paper draws heavily on our report of that work (See, Hall, Jaeger, Kearney, & Wiley, 1985).

September 19, 1986
Ann Arbor, Michigan

NAEP: A NATIONAL DATA SYSTEM FOR THE 21ST CENTURY

C. Philip Kearney
The University of Michigan

Introduction

Information about the condition of education--about the quality of schools, school districts, and state educational systems--has become a priority concern for the increasing array of new policy actors now involved in making decisions that affect the quality of the education being received by the Nation's children and youth. Unfortunately, however, current data systems are not capable of fully meeting these rapidly expanding needs for information about education. At best, they represent an unarticulated set of discrete projects rather than a program or system for providing comprehensive, integrated, representative, accurate, and timely information on the elementary and secondary schools of the Nation (Silverman and Taueber, 1985; Hall, Jaeger, Kearney, and Wiley 1985).

However, in our view, one of these discrete pojects--the National Assessment of Educational Progress (NAEP)--more than any other existing data project has inherent within it the potential to become a truly national data system and to meet the rapidly expanding needs for educational information. The present moment, when the future configuration of NAEP is being debated and decided, offers an excellent opportunity to move to develop NAEP into such a data

system--a system that will provide comprehensive, integrated, representative, accurate, and timely information on elementary and secondary education in these United States, and a system that will be up to meeting the information challenges of the 21st Century.

NAEP, in its original configuration, did not have such potential due, in large part, to the political constraints of the time. Messick, Beaton, and Lord (1983) remind us that:

> The original design of the National Assessment of Educational Progress (NAEP) was brilliantly responsive to the political constraints of the time. . . . the original NAEP design attempted to take due account of the existing political and social realites that were likely to jeopardize its successful implementation. . . . Of prime importance was the feeling that the sanctity of local control of education might be perceived to be undermined by a nationally imposed assessment effort if it conveyed overtones of national curriculum and national testing. (p. 1)

But times have changed and so have the contexts of educational decsion making. The fear of a national testing program, such as NAEP, has largely dissapeared; indeed, NAEP has been criticized for not delivering more useful information to educational decisionmakers (Messick, Beaton, and Lord, 1983). One of NAEP's more vocal critics in the 1960's, the Council of Chief State School Officers (CCSSO), currently is taking steps to create its own national testing program and to include in its program the capability of providing achievement information that will allow comparisons among the several states (Selden, 1986). In the 1960's, the organization--and its membership--would have considered this anathema.

The lessening of fears about a national testing program and about undue infringements on local control of the schools has been accompanied by other major changes in the contexts in which education decisions are made. Chief among these have been changes in both the

locus of educational decision making and the cast of educational decision makers. We have witnessed an opening up of the decision making process and an almost total erasing of public education's traditional identity as a separable and special governmental operation. These changes have resulted in pulling educational issues into the political mainstream; in opening up the system to parents, to the general public, to general government, and to special interests; and in forcing professional educators to integrate diverse segments of the community into the decision making and policy making processes of education. Educational decision making has become an evolving, interactive process open to external ideas and influences, involving many individuals and groups, involving all levels of government, and all levels of organization and program administration. But it is not only the locus of educational decision making that has changed. The cast of educational decisionmakers has been greatly enlarged--parents, other citizens, representatives of interest groups, educators, executive staff, legislative staff, legislators, governors, Congressional staff all have become participants in the process.

Central to these major changes in the contexts of educational decision making is an increasing demand for data--data on how students are doing in our schools, on what they are learning, on their levels of achievement; data on how teachers are doing, on what constitutes good teaching, on the mix of conditions necessary to ensure that our professional teaching ranks become filled with "the best and the brightest;" data on curricular programs, on effective instructional practices, on new ways of learning; data on the context in which schools operate, on the climate in the classroom, on family, social,

and economic environments; data on resources, on the most effective mixes and uses of resources, on resources and equity issues; data on alternative approaches to schooling, on the private sector of schooling, on choice within the public sector. Yet, as we noted above, existing national data projects fall far short of meeting these expanding needs for more comprehensive, integrated, and representative information.

In sum, American education is changing rapidly, with new educational policies that affect all participants and stakeholders. To understand the need for policy change, its short-term impact, and its long-term effects, will require a radically improved, and vastly changed, national education data system.

Fortunately, in our view, the upcoming reconfiguration of NAEP presents an opportunity "to seize the day," to capitalize on a program which already is in place, already moving toward expanding its purview, and to use it as the base for building a national data system for elementary and secondary education in the United States. Three years ago, in presenting the conceptual framework and major features of its new design for NAEP, Educational Testing Service (ETS) argued that its program would have to meet this expanded need for information:

> The central question now before the directors of NAEP is how to conduct a national assessment that will be directly relevant <u>to state and local policy-makers</u> [emphasis added] as well as serve as a creditable national indicator of educational competence for the general public (Messick, Beaton, and Lord, 1983, p. 7).

Three years prior, Henry Acland (1980) set forth what he saw as the major functions of NAEP: (1) to provide an information base for

federal policymakers, (2) to establish a data base for research, (3) to keep track of performance levels, and (4) to help state and local education agencies. This set of objectives, the 1983 ETS observation that NAEP must be directly relevant to policy makers at state and local levels, and the fact that NAEP already has moved well beyond exclusive collection of outcome data, would seem to corroborate the argument that NAEP, in the future, can and should become the central vehicle for establishing a new national data system for elementary and secondary education.

Under such a configuration, NAEP could provide comprehensive information on education--information not only on the outcomes of schooling, but also on school setting and the schooling process itself. Under such a configuration, NAEP could provide integrated information, that is, information that provides linkages between and among outcomes, settings, and processes. Under such a configuration, NAEP could provide information representative not only of the Nation as a whole and its major regions, but also information representative of individual states. Under such a configuration, NAEP could provide accurate, comparable, and timely information. Under such a configuration, NAEP could begin to meet the now largely unmet needs of the increasingly broad array of educational policy actors identified above.

An added benefit of moving in this direction would be a definitive resolution of the future role of NAEP and its place among the discrete and sometimes competing education data projects mounted at the national level. For example, a redesign of NAEP along the dimensions outlined above might negate the need for the separate and

costly effort being undertaken by the CCSSO to acquire state-by-state information on the outcomes of schooling. The redesign of NAEP as the national data system on elementary and secondary education also offers promise of resolving the current dilemna of the Center for Statistics, namely, whether to continue to tinker with its present inadequate "non-system" or to move forward to build the new and substantively different system suggested as part of its redesign project (Hall, Jaeger, Kearney, and Wiley, 1985). Finally, a redesign of NAEP so that it becomes, in fact, the national data system for elementary and secondary education holds promise of meeting the concerns reportedly voiced in the soon to be released report of the National Academy of Sciences, in which the Academy notes that the Center for Statistics currently does not possess the human resources needed to mount and sustain a quality national data system. Reliance on the private sector rather than a governmental agency for the design and operation of the system, as has been the practice with NAEP since its inception, would seem to hold greater promise for the development and implementation of a national data system of the highest quality.

The Broad Outlines of a Reconfigured NAEP

If one accepts the argument that serious consideration should be given to building NAEP into the national data system on elementary and secondary education, the data system that will meet the expanding infomation needs of the broad array of actors involved in education decision making, one then has to ask, "How might we go about that?" In the pages that follow, we attempt to answer this question by laying out the broad outlines of what a reconfigured NAEP might look like.

First, we describe a comprehensive conceptual model of the schooling process; only if we have a conceptual framework to guide the assessment of educational quality can we make appropriate choices about what information to collect and in what form it should be made available. Second, we establish a set of basic criteria which should guide the reconfiguration of NAEP if it is to become the national data system on elementary and secondary education. Third, we suggest, in broad outline, what paths the development and phasing of the NAEP redesign might follow. Fourth, we identify some examples of the benefits that will be provided by the redesign of NAEP along the lines we propose. Finally, we suggest some next steps that might be taken if serious consideration is given to our proposal.

One major caveat is in order. We do not assume that the reconfiguration we are proposing can or should be accomplished overnight. Indeed, one of the attractions of developing NAEP into the national data system is that NAEP already exists; it represents a strong base on which to build. It can continue to deliver important and valuable information even as it systematically moves toward full implementation as the national data system. Concurrently, as a reconfigured NAEP implements new modules, other existing national data projects can be phased out without major upsets in important data streams. While we are acutely conscious of the immediate unmet needs of data users, we also recognize that we are discussing the design of a system that must serve us well into the 21st Century.

A Conceptual Model of the Schooling Process

NAEP, if it is to serve in the future as the national educational data system, must be designed to fulfill the information needs of those who have authority and responsibility for maintaining and enhancing the quality of the educative process as it takes place in the schools and school systems across the land. This group includes, at a minimum, educators, citizens, public officials, and parents. If a redesigned NAEP is to meet fully their information needs, then it must supply information not only on the outcomes of the educative process, but also on the process itself as well as on the contexts in which the process takes place.

If we are to apprehend fully this educative process and the influences that bear upon it, we must rely upon a conceptual model. This model may be simple or complex and it may be implict or explicit, but its existence is a prerequisite to any understanding of the effectiveness and quality of schooling. Our conceptual model--outlined below--for describing an educational system focuses on the school because it is at the level of the school that educational activities take place and that pupils participate in them. Our model is drawn from the work of Harnischfeger and Wiley (1985).

Fundamentally, schools and communities they serve differ in several important ways:

1. Family and Community Environment. The families and communities served by different schools differ in significant ways. They differ in the resources available in the homes of the pupils for support of their schooling. They differ in types and levels of aspirations parents have for their children. The

family composition of the community affects the attitudes, values, and goals of a pupil's peers. All of these form the context within which schools can educate their pupils.

2. Educative Difficulty. Schools are faced with differences in the types and levels of educative difficulties with which their pupils present them. Some present handicaps or limited proficiencies in English. Others come with limited levels of prior learning. Still others enroll with cognitive accomplishments and capabilities, motivations, and out-of-school environments and resources which make the educative efforts in some schools easier and less complex than those in other schools.

3. Resources. Schools have available to them different levels of monetary resources and different amounts and kinds of non-monetary resources, such as vounteer time, and donated supplies and equipment. These resources are exchanged, allocated, and configured to provide a teaching staff, facilities, educational materials, and the like.

4. Goals. Schools aspire to distinctive goals. For example, some public secondary schools design their entire curriculum around post-secondary career paths which primarily begin in selective colleges and universities, while other schools--for example "vocational" ones--may focus their entire program around immediate job entry to skilled and semi-skilled occupations.

5. Process. Schools offer educative experiences for which they require or encourage pupils' participation. In addition to in-class experiences, these include work experience, homework, Schools also structure these experiences around different standards. These standards influence the pursuit of goals with different expectations for performance, differing time allowances for accomplishment, and differing criteria for selection into subsequent experiences. Schools also differ in the types and amounts of participation of their pupils in these educative experiences as well as in the range of experiences made available. These variations include differences in selection, participation, and completion of educational programs, course work, and homework as well as differential school attendance.

6. Outcomes. All through the schooling process, to the conclusion of secondary schooling and beyond, schools differ greatly in the goal-relevant accomplishments and achievements of their pupils. These include cognitive capabilities, credentials, and career and life paths generally.

None of the above areas can be neglected if we are to understand schooling in ways that carry meaning for those who participate in it and those who are concerned about it and its consequences. School outcomes may differ by intent as well as efficacy of programs and activities. Schools, school districts, and entire school systems are presented with considerable variations in the levels of preparation, handicaps, and other educative difficulties that their pupils bring to the schooling process and these have profound consequences for

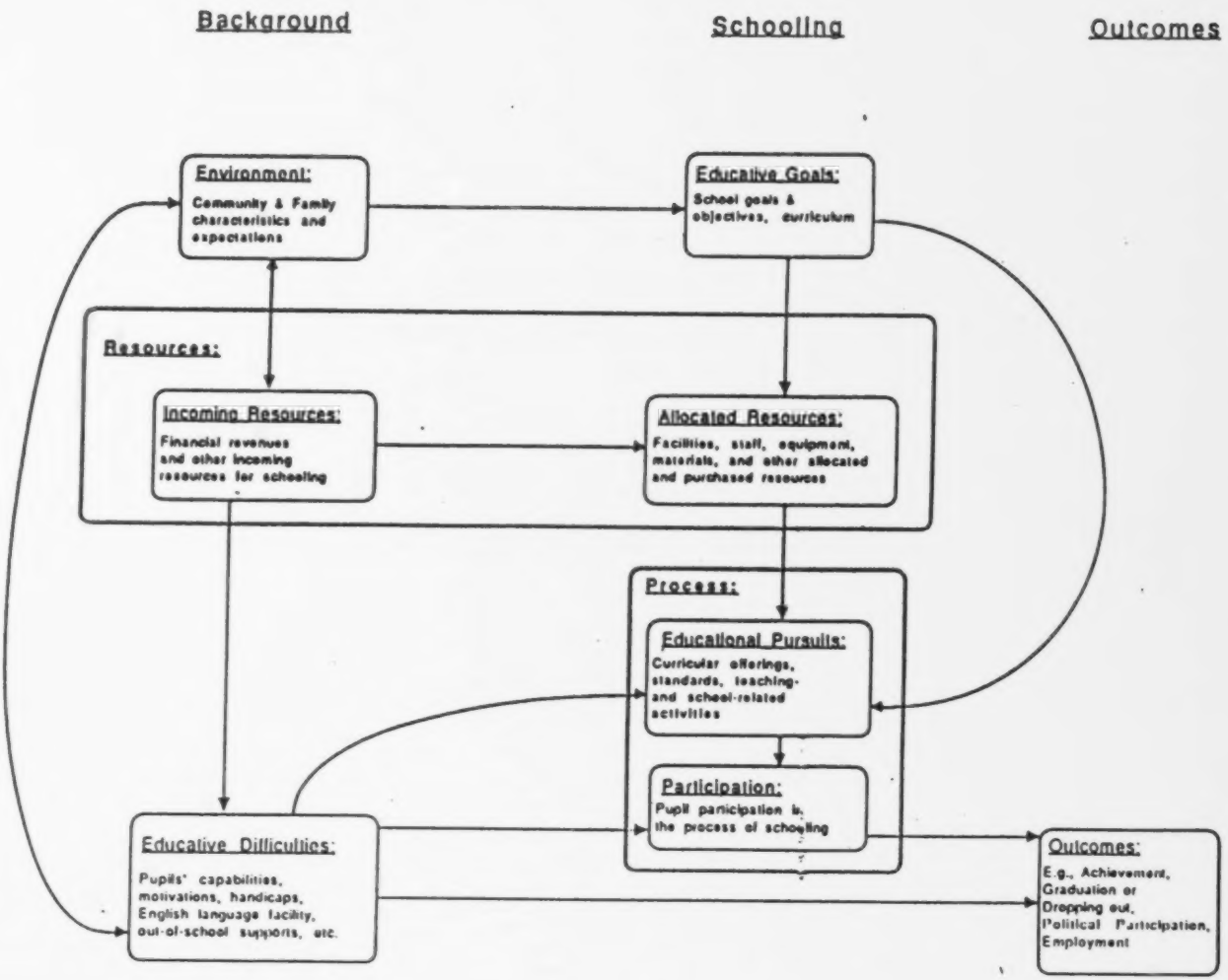
outcomes. And schools and the larger systems within which they are embedded really do differ in their effectiveness. Thus it is vital to describe, against a conceptual framework, each of these differences in cohesive fashion, as well as to attempt to sort out the reasons for differential outcomes against the structure of their origins.

Figure 1, on the next page, displays such a conceptual framework. It focuses on the schooling process, distinguishing teaching activities from pupils' exposure to and participation in the resulting educative activities. And it traces these aspects of the process to their origins--prior and contemporaneous characteristics of pupils, community and family expectations, curricular goals, and resources--as well as linking them to their consequences. Within the context of school quality assessment and its bearing on school improvement, this conceptual framework treats goals, educative difficulties, and resources as pre-conditions or background elements for process description and outcome interpretations.

The Basic Design Criteria

What, then, are the implications of this conceptual framework for the redesign of NAEP as the national data system for elementary and secondary schooling? First, in order to meet the information needs of the broad array of local, state, and national educational decsion makers identified earlier, the data base must be structured to provide information on all aspects of the schooling process as described in our conceptual model. This means that the data base must be comprehensive; put simply, it must be adequate in scope and

Figure 1. A Conceptual Frame for the Schooling Process



coverage; it must contain accurate, appropriate, and timely information on (1) the school setting, (2) the schooling process itself, and (3) the outcomes of schooling.

A second major requirement of the data base, in addition to being comprehensive, is that it be integrated, that is, that its data sets and elements be linked to one another. The user must be able to ask and have answered questions about the relationships among background characteristics, the schooling process itself, and the outcomes of the process. The data base must be able to provide information to answer to such questions as, "What dollars buy what services for which students with what results?" Or, "What programs staffed by what types of teachers are effective for pupils with particular educative difficulties?" Only if the data base is so structured as to allow relevant linkages among its components will the requirement for an integrated educational information system be met.

Third, the dual requirements for a comprehensive and an integrated system demand, in turn, that data be collected in micro-record form, as opposed to macro-record or aggregated form. We define a micro-record as a datum on an individual person or entity rather than a datum on a collection or aggregate of individual persons or entities. A micro-record can be dealt with as an individual datum or aggregated; for example, individual micro-records on pupils can be aggregated to the school level. A macro-record, on the other hand, cannot be diaggregated. More importantly, the micro-record permits of linkages with other micro-records; for example, micro-records on

individual pupils can be linked with micro-records on individual teachers and, in turn, with micro-records on specific curricular offerings in which the teachers and pupils are participating. The micro-record format, through its linkage capability, permits the information user to ask questions about relationships among the sets that make up the data base.

The three previous requirements identify basic criteria that must be met in establishing a redesigned NAEP data base and for getting information into that data base. A third issue remains, namely, what processes will be used for getting information out of the data base? Thus, a fourth requirement is that a national educational information system must be able to deliver information of a comprehensive and integrated nature on the schooling process in the Nation as a whole, that is it must be capable of delivering information that is nationally representative. It must be able to report on the status and progress of elementary and secondary schooling in the United States. It also must be able to deliver information on sub-national or regional populations. NAEP, of course, meets this part of the requirment. But, in addition, we take as a given that a national data system for the 1980's, 1990's, and the 21st Century also must be capable of producing information that can be used to compare the condition and progress of education in the various states; in short, the redesigned system must be capable of delivering information that is representative of each of the fifty states.

While this requirement dictates attention to how information

gets into the data base, e.g., the sampling designs which will be employed, it also dictates--along with the previously identified requirements of comprehensiveness, integration, and micro-record formats--what types of reports must be available to users of the system. Users, with the possible exception of researchers, generally will not be interested in micro-records per se but rather reports developed from the processing of micro-records --e.g., tabulation, aggregation, and analyses. Thus, while micro-records represent the form in which information flows into the data base, reports based on processing of the micro-records represent the form in which information flows out of the data base. Yet, a simple proliferation of reports will not meet the needs of the broad array of local, state, and national decison makers which we identified in the opening pages of this paper. A national educational information system must be capable of carefully tailoring its reporting formats and mechanisms if it is to serve the particular needs of this broad array of decision makers. Certain decision makers, for example Governors, have needs for only certain kinds of information and not for other kinds; the system must be capable of meeting these needs. In short, the system must be <u>capable of screening and matching its reporting formats with the needs of particular users</u>. In addition to questions of content, the screening and matching require attention to establishing the mechanisms necessary to actually get the reports to decision makers and decision makers to the reports and, in the case of researchers, to the relevant portions of the data base itself.

Finally, the development of processes for getting information out of the system has to pay serious attention to timing. Unless the information is available when needed, the content and form of the reporting mechanism makes little difference. Timing involves setting priorities for reporting different sets of information to different users, as well as priorities for providing different users access to different sets of information. In sum, NAEP, as a national educational information system, must be capable of delivering periodic and differentiated reports on the status and progress of schooling to a broad array of local, state, and national decision makers, as well as making available to different users, including researchers, special reports on and public use samples relevant to particular aspects of elementary and secondary schooling in the United States and in the several states.

These then represent the basic requirements that a redesign of NAEP must meet if it is to fulfill its promise of becoming the national educational data system. We now reiterate these requirements, as well as certain additional requirements, in more succinct form and identify them as the basic criteria that we believe should guide the future design and development of NAEP. The basic criteria are:

1. COMPREHENSIVENESS--the system must have a data base capable of providing information on all pertient aspects of elementary and secondary schooling including background characteristics, the schooling process itself, and the outcomes of schooling.

2. INTEGRATION--the elements, files and records in the data base must be linked; all data sets must be capable of being related to one another.

3. MICRO-RECORD FORMAT--all data must be collected and stored in micro-record format, with a micro-record being defined as a datum on an individual person or an individual entity.

4. REPRESENTATIVENESS--in addition to being nationally representative, the information in the data base must be representative of each of the fifty states, as well as representative of other important variables such as sex, racial-ethnic composition, urbanization, and so on.

5. ACCURACY--all data must be verifiably accurate; they must be subjected to rigorous quality control procedures including audits, reinterviews as a routine part of data collection, controls on data entry and data processing, consistency and completeness edits, and regular and routine calculation of measures of variance.

6. COMPARABILITY--data from different jurisdictions must reflect the same concepts and definitions; common units of reporting and common definitions are necessary precursors of useful data aggregations.

7. TIMELINESS--in general, data must be limited to that which can be collected, stored, and analyzed within three months and reported to policy makers within the year.

8. PRIVACY AND SECURITY--because some of the files contain information about individuals, e.g., personal identifiers necessary for longitudinal studies, strict confidentiality and security measures must be in force.

9. PROCESSING AND ANALYSIS--a specific schema must be available for processing the micro-records in a manner designed to optimize the analytic capacity of the system.

10. INFORMATION FLOWS--the system must be capable of screening and matching its reports to meet the particular needs of particular users; a wide array of reporting formats and access mechanisms must be available to serve the different users; specific priorities must be set for meeting the different timelines imposed by the needs of different users.

11. COST OF TRANSMISSION/ACCESS--a pattern of shared user costs should characterize the system; rather than rely exclusively on federal support for transmitting information to users and/or providing them access to

information, a national educational data system should also draw support from a program of user fees and thereby increase its capacity to to serve the differing needs of its users; equally important, transmission/access modes should incorporate the latest developments in electronic communications technology.

Development and Phasing

Transcendent Development and Phasing Issues

The redesign of NAEP as the new national data system on elementary and secondary education would substantially affect current data collection, analyis and reporting activities in state education agencies, in local education agencies and in the U.S. Department of Education. A new national data system will require dollar resources currently allocated to ongoing federal projects and will impose respondent burdens that will preclude the continuation of numerous existing federal data-collection projects and the intiation of others. Issues such as these transcend the selection of a data system design, and influence the phasing and timing of data system development and installation. The most pertinent of these issues are:

(1) preservation of essential time data series;

(2) requirements for research needed to develop critical elements of the new data system;

(3) provision of adequate time for data system testing and verification;

(4) impact on current state and local education agency data systems; and

(5) cost and personnel requirements.

Preservation of essential time series. Although we began this paper with an identification of the inadequacies of present national data projects, nevertheless, the Center for Statistics over

the years has maintained several essential data time series. Examples can be found in the Center's publications, The Condition of Education and the Digest of Educational Statistics, and include, by way of illustration, total enrollments at all levels of education throughout the United States which have been reported since 1899-1900 (Digest of Educational Statistics, 1983-84, Table 3, p. 8). Such time series must be preserved in the redesign of NAEP into the new national data system.

Requirmements for Research Needed to Develop Critical Elements of the New Data System. Most elements of the new national data system we are proposing can be developed using existing survey and measurement technology. However, other elements undoubtedly will test the current state of the survey and measurement art and will require intensive research and development. For example, the system we are proposing requires micro-record information on a variety of educational outcomes including, but not limited to, achievement test data. To secure such data while adequately controlling the respondent burden imposed on individual students will require the development of new, highly efficient outcome measures and new approaches to the use of matrix sampling. As a second example, our proposed system calls for timely production of policy-relevant analyses that are responsive to immediate and particular requests from the broad array of information users including policy makers in all levels and branches of government, as well as the new constituencies identifed in the initial section of this paper. Considerable research is needed to develop mechanisms that will enable the NAEP contractor to meet these immediate and particular requests for information with

timely, valid, and responsive policy-relevant analyses. Research will be needed in such areas as verification of the requestor's rights to data access, mechanisms for rapidly and accurately building relational analyses using data stored on the basis of distinct file structures, methods for provididng users with a variety of alternative relational analyses, and methods for assessing the relative utility to policy makers of such alternative analyses.

Provision of Adequate Time for Data System Testing and Verification. Because many features of the data system we are proposing are novel, extensive testing and verification of mechanisms for data collection, data aggregation and storage, and information retrieval will be required. Such testing will require a continuing commitment of resources by the federal government, a continuing commitment by the NAEP contractor, and the continuing cooperation of state and local agencies over a period of years. Every effort should be made to ensure that no element of the data system will be used operationally until it has been throughly tested and its quality has been verified.

Impact on Current State and Local Education Data Systems. If a state chose to keep its own data systems completely separate from the national data system, no additional data burden would be imposed nor would the state be required to adapt its data-element definitions to be coincident with those of the national system. On the other hand, if a state chose to fully integrate its data systems with the national system, it would have to accept and adopt the data-element definitions used in the national system, and it would have to adopt

the micro-record structure that is central to our proposed redesign.

The impact of the proposed national data system on local education agencies generally would be limited to those local schools and districts that would be included in the state representative samples used by the system in a given year. In sampled schools and districts, the volume and density of data collection envisioned for the new national system repesents substantial data burden and likely would require local agencies to adapt their own data systems in several ways. For example, local agencies might choose to make the data element definitions they use consistent with the newly designed national system. Local agencies might also choose to make the structure of their data systems conistent with the micro-record structure of the national system we are proposing.

Cost and Personnel Requirements. In any truly national data system on elementary and secondary education, a large portion of the costs of developing and maintaining the system would be borne by the federal government--in our proposal by contracting with independent organizations and agencies selected to design, develop, and implement the system. In particular, the costs of necessary research and development would be borne entirely by the federal government, as would the costs of testing and verification.

State costs and personnel requirements would depend almost entirely on a state's chosen level of participation in the system. To the extent that a state chose to integrate its data systems with the newly designed national system, it would share to some extent in the cost of developing the system. Dollar outlay costs and personnel

costs incurred by local education agencies would depend on the degree to which they chose to integrate their own data systems with the national system--and the degree to which their state chose to integrate its data system with the national system.

Specific Development and Phasing Issues

Phases of Development. We propose that the redesign be carried out in distinct calendar phases encompassing a five-year period. Within each phase, the specific categories and subcategories of data elements which would compose the new national data system would be at different levels of development. Data elements would differ in terms of their availability for operational use and the level of their aggregation. Some data elements would be objects of research and development; other data elements would have advanced to a field testing and verification stage; still other data elements would have been tested and verified in earlier phases, and would be available for operational use; a fourth category of data elements would not yet be available in any form. In addition, some data elements would be available initially only from aggregate records, while others would be available in the form of micro-records. The phases would also be distinquished by the numbers and types of data elements that could be linked across data categories and data files, as micro-records become available for operational use.

Categories of Data. The categories and subcategories of data that would compose the proposed national data system would be drawn directly from the conceptual model described earlier. The major categories include: environment (community and family characteristics and expectations); incoming resources (financial

revenues and other incoming resources for schooling); educative difficulties (pupils' capabilities, motivations, handicaps, English language facility, out-of-school supports, etc.); educative goals (school goals and objectives, curriculum); allocated resources (facilities, staff, equipment, materials and other allocated and purchased resources); educational pursuits (curricular offerings, standards, teaching- and school-related activities); participation (pupil participation in the process of schooling); and outcomes (achievement, graduation or dropping out, political participation; employment).

Calendar Periods. We propose that the first phase of development begin on July 1, 1987 and extend to December 31, 1987. The second phase of development would begin on January 1, 1988 and extend to June 30, 1988. Subsequent phases would encompass six-month periods thereafter, through June 30, 1992.

Status of Data Elements. In any phase, each data element that would be a part of the redesigned national data system could be characterized as belonging to one of three categories of development. At one extreme, would be data elements that are not yet included in any form. An intermediate category would be data elements that were collected only in aggregate form, e.g., school membership determined from a report prepared by a school. We do not propose that the new system would be responsible for developing such aggregate reports, but only for maintaining specific elements that currently are a part of critical Center for Statistics data-collection activities until they could be replaced by tested and verified micro-records. These micro-records would constitute the third category--that is, the other

extreme of development--of data elements. Currently, such micro-records only exist in data projects such as NAEP and NELS, which again argues for using NAEP as the base for building the new national data system.

Availability of Data Elements. We believe that most, if not all, of the data collection formats for elements required in early phases of implementation of the new system already exist within current data programs, and particularly in NAEP and NELS. Development of revised data collection formats and activities aimed at incorporating existing NAEP and NELS data elements and formats would be required to implement the system, but more fundamental "research" activities would not. At any phase of development, however, a data element that existed in micro-record form might not yet be available for operational use. Initially, some micro-record data elements would require extensive research and development. Any newly developed data element would be subject to extensive field testing and verification; that is, any new data element in micro-record form would not become a part of the operational data system until convincing evidence of its validity and utility had been amassed.

Linkage Among Data Files. As the different sets of data elements become available for operational use, linkages among these sets must be established, tested, and verified. The testing and verification also must include assessment of the relative utility of the relational policy analyses generated from the linked data sets. These assessments must continue and encompass the increasingly larger number of linked data sets that come on line as additional micro-records become operational, until the new system becomes fully

operational.

Concurrent Development Activities. While we will not elaborate here, implicit in the research, development, testing and verification activities outlined above are such data system design and development activities as the identification of essential populations of generaliazation; the design and selection of samples of data suppliers; the design of mechanics for the collection of data, including specifications for, recruitment of, and training of data collectors; the design of survey field procedures; the design of plans for the analysis of data and reporting of results; the development of systems for transmission of data; and the development of software systems for data receipt, control, editing, analysis, and summarization. In Table 1, on the following page, we provide a truncated outline illustrative of the development and phasing activities outlined above. For example, under the category "Environment" we identify the sub-category "community and family characteristics" and indicate that, at present, data in this sub-category are collected only in aggregate form in the data collection activities currently being conducted by the Center for Statistics. In Phase I, research and development activities would be undertaken; in Phase II, testing and verification would take place; and in Phase III, the data would become available in micro-record form. The remainder of Table 1 can be read in the same fashion. In the sub-category "school goals," for example, research and development activities would not begin until Phase III, whereas in the sub-category "dropouts"--where data in aggregate form already are being collected--research and development activities would begin

Table 1. Illustrative Status of Categories and Subcategories of Data at Various Phases of Development of the National Data System

Categories & Subcategories	Status of Data Category: Current	Phase I	Phase II	Phase III
Environment:				
Family and commun. characteristics	Ag.	Ag.(R&D)	Ag. (T.&V)	Micro.
Resources:				
Financial revenues	Ag.	Ag.	Ag. (R&D)	Ag.(T&V)
Educative Difficulties:				
Handicapped status	Ag.	Ag.(R&D)	Ag.(T&V)	Micro.
Motivation	Non.	Non.(R&D)	Non.(R&D)	Non.(T.&V)
Educative Goals:				
School goals	Non.	Non.	Non.	Non.(R&D)
Participation:				
Course enrollment	Micro.	Micro.(R&D)	Micro.(T&V)	Micro.(Rev.)
Outcomes:				
Dropouts	Ag	Ag.(R&D)	Ag.(T&V)	Micro.

LEGEND:

Non. denotes a data subcategory that does not presently exist in the set of projects operated by the Federal Center for Statistics.

Ag. denotes a data subcategory in which data are presently collected only in aggregate form in the set of projects operated by the Federal Center for Statistics.

Micro. denotes a data subcategory in which data are presently collected in the form of microrecords in the set of projects operated by the Federal Center for Statistics.

(R&D) denotes a data subcategory in which research and development is to be conducted.

(T&V) denotes a data subcategory in which testing and verfication is to be conducted.

(Rev.) denotes a data subcategory in which the data previously existed in the form indicated, but for which revised data elements are developed and adopted.

immediately in Phase I. Note that Table 1 illustrates only the first three of ten proposed development phases.

Establishing Priorities for Development and Phasing

Table 1 is only illustrative of the types of decisions that would have to be made in the redesign of NAEP into the national data system for elementary and secondary education. The actual choices of the order in which categories and sub-categories of data elements would be developed would need to be made by the U.S. Department of Education working in concert with representatives of state and local education agencies and contractors selected to design and implement the system. However, we propose consideration of the following priorities.

The conceptual model defined earlier in this paper provides categories of data that are required to meet the information needs of education policy-makers at several levels of government, as well as those of the new constituencies for information identified in the opening pages of the paper. Of all data categories defined by that model, school process information is least available now. School process information includes: information on the educative goals of the schools; on allocated resources--facilites, staff, equipment, and materials; information on educational pursuits, curricular offerings, standards, teaching-related and school-related activities; and information on pupil participation in the process of schooling. There also is a critical need for high quality outcome data. The best outcome data available are presently provided by NAEP--again corroboration of the argument that NAEP is particularly well-situated to become the base of a new national data system. However, under current arrangements, NAEP data are limited to students at relatively

few grade levels, are only collected biennially, and are limited in subject matter tested. Thus, in our view, two categories of data--school process data and outcome data--deserve priority attention in the development of the proposed system.

Yet, although we believe that information on process and outcome should have the highest priorities in terms of information needs, we also believe the new data system should attempt first to build micro-records on a small sub-set of data in order to develop the collection process and refine the data base development process. Information on pupil participation which would provide data for enrollment and attendance would be our priority candidate for initial development. At the same time, the research effort to develop a more comprehensive set of process and outcome data should be given high priority, as we argued above, and proceed on a parallel track.

School context information should constitute a third area of priority development, particularly information which describes the environment in which schools operate, such as community and family characteristics and expectations, as well as information that describes the eduative difficulties of students. In our judgement, these two categories of data should receive attention once the development of micro-records is well underway in the school process and outcomes categories.

Our fourth order of priority would be to address data needs in the educative goals category. A final priority, but certinly essential, would be the categories of incoming and allocated resources, including revenues, and expenditures for, and stocks of, materials, equipment, facilities, and personnel. As is clear from

Table 1, above, certain existing aggregates are recommended for phasing into micro-record formats in stages beyond Phase I. This raises the issue of parrallel aggregate reporting for existing aggregate data series to allow users to move from the old problematic series into the micro-record based series. This overlap will need to be carefully planned into the phasing of the new system.

Some Benefits of the Redesigned System

The consumers of information about educational systems include parents concerned about the education of their children, citizens worried about the quality and and efficiency of the education their tax dollars finance, professional educators making decisions about programs and pupils, and public officials desiring to design laws, requirements, and resource allocations which will effectively improve education. All of these consumers are concerned that the information which reaches them be relevant and useful to their needs, timely, and accurate.

Common to all of the consumers are concerns about quality and effectiveness. It is this information which is most desired in the public debate over education. Parents want to know about the quality of educational alternatives available to them. Citizens and public officials wish valid assessments of efficiency to know that resource allocations are wisely made and carried through to desired outcomes.

Resource flows are important information for public officials in making determinations of how much and how to allocate resources. Federal officials have special concern for how federal resources are channeled to pupils and the impact of these resources on pupils with specific characteristics. State officials, in fulfilling their

responsibilities, have been modifying state educational systems in ways that require comprehensive information about participation in programs, courses, and other services, about standards of performance, and about actual outcomes. Local officials are newly concerned that they are effectively monitoring service delivery, participation and achievement.

An effectively integrated system--incorporating the micro-data and records necessary to produce these new types of information--is needed by all concerned parties. The benefits of a cohesive system of the type we are proposing, capable of producing national and state comparable data, would be far reaching. Not only would the majority of consumers of educational information be provided with relevant, integrated, timely, and accurate information at these two levels, but the establishment of such a system would produce similar changes in district-level information systems. This, in turn, would increase the comprehensiveness and comparability of the information about education taking place in local communities. Thus, in our view, the proposed redesign of NAEP into the national educational information system on elementary and secondary education, as it becomes established at national and state levels, will introduce cohesion in the total system.

Possible Next Steps

This present paper, at best, has sketched only the broad outlines of a proposal to build NAEP into <u>the</u> national data system on elementary and secondry education. Much more specific and detailed attention needs to be given to the issues and areas outlined in the

paper, as well as to a good many more issues and areas not mentioned or only lightly touched upon, if such a proposal is given serious consideration in the redesign of NAEP. For example, the cooperation and collaboration of state and local education agencies in the design and development of the system is critical. Mechanisms for effectively bringing about such cooperation and collaboration would need to be established early on in order to ensure the success of the effort.

Fortunately, a relatively detailed plan for the development of a comprehensive, integrated, representative, accurate and timely national educational information system already exists (See, Hall, Jaeger, Kearney, and Wiley, 1985). This plan was developed as part of the NCES Data Redesign Project launched in early 1985, is based in part on extensive review of the forty or more invited papers submitted to the Redesign Project (Silverman and Taueber, 1985), and sets forth a general blueprint for a fundamentally new national data system for elementary and secondary education. It can provide further guidance for those who would give serious consideration to the argument that NAEP should form the base and core of such a system--a system capable not only of meeting information needs in the 1980's and 1990's, but also serving the needs of education decision makers well into the 21st Century.